

Developing Assurance Framework of Cloud Computing in the implementation of ERP: A Literature Survey

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Abstract— Small and Medium Enterprises (SMEs) are said to be the lifeblood of any vibrant economy. They are known to be the silent drivers of a nation's economy. SMEs of India are one of the most aggressive adopters of ERP Packages. Most of the Indian SMEs have adopted the traditional ERP systems and have incurred a heavy cost while implementing these systems. Cloud computing has changed the era of doing the business in the global market. In the present scenario with the help of cloud based infrastructure the consumer will get the feeling of using the resources as if they are on his own computer system. The major goal of the present paper is to review the development of low cost ERP solution to Indian industries using latest technologies such as cloud ERP, to frame the multi-tenant assured framework in which there exists security and privacy.

Keywords- ERP; cloud computing; CSPs; SMEs

I. INTRODUCTION

Enterprise Resource Planning (ERP) systems have been popular information technology (IT) applications since 1990's. Prior research has focused predominantly on ERP implementation in large organizations, while research on ERP implementation in small and medium sized enterprises (SMEs) is still lacking. This is not surprising, since ERP systems could only be afforded by large companies in past years. Until recently, due to the realization of the importance of SMEs in global industry, several ERP providers have started to introduce new cloud-based ERP systems to the marketplace. Cloud based ERP systems are the hardware and software systems that support the core processes in the business process. All the data and information resources are managed by Enterprise Resource Planning Systems in the business organizations. This information is stored in centralized and shared data stores. One can use Cloud based tool to perform the business globally. The different tools available under the

cloud computing that provides the lowest cost working environment and is suitable for the developing economy. The huge amount of research is going on interfacing the ERP with cloud. In the present scenario many organizations today are turning to the cloud based ERP systems in their business. There are many reasons of choosing the cloud based ERP. Some of these reasons are:

- Do not want to buy the servers, in-house software development and not to hire the skilled IT professionals.
- Becoming more complex, and challenging to manage the ERP.
- Organizations have complex ERP system need something easier and more economical.
- Top management doesn't want to spend it on traditional ERP system.

To achieve the above goals many service subscribers (tenants) often share the same remote physical infrastructure put in place by the cloud service providers (CSPs). This concept introduces a new pedagogy i.e. multi-tenancy. Due to multi-tenancy there is a fear of breach of security and privacy risks. Now, it becomes a challenge for the SMEs to select a suitable CSP whose security and privacy mechanisms must meet the security requirements of the organizations. The various solutions to these problems have been proposed by the researchers. In this paper, we review the various techniques suggested by the researchers to architect the Multi-Tenant Security Assurance framework to implement the Cloud based ERP.

II. ENTERPRISE RESOURCE PLANNING (ERP)

ERP is an integrated computer based application used to manage internal and external resources, including tangible assets, financial resources, materials, and human resources. An ERP system can either reside on a centralized server or be

distributed across modular hardware and software units that provide "services" and communicate on a local area network. It is an intelligent software architecture that supports the streaming and distribution of geographically scattered enterprise wide information across all the functional units of a business house. The major aim is to control functional areas within the enterprise such as supply chain management, accounting and finance, material management, inventory control, and human resources. ERP is suitable for all the three levels of Management i.e. strategic, tactical and operational level. Today ERP can be applied to any type of organization, operating in any kind of field.

III. CLOUD COMPUTING

Cloud Computing is a new computing paradigm for delivering the computing services. The Cloud Computing provides the special services on the internet. These services can be Networks, Servers, Storage environments, Software, Services etc. Cloud computing can be classified into the three major categories:

- IaaS (Infrastructure as a Service)
- PaaS (Platform as a Service)
- SaaS (Software as a Service)

In Infrastructure as a Service, customers buy their needed infrastructures, one can own and purchase the software and virtual power to execute as needed. This service is a running virtual server on a virtual environment. One pay for the usage as per his/her own requirement. This minimizes the need for huge initial investment in computing hardware such as servers, networking device and processing power.

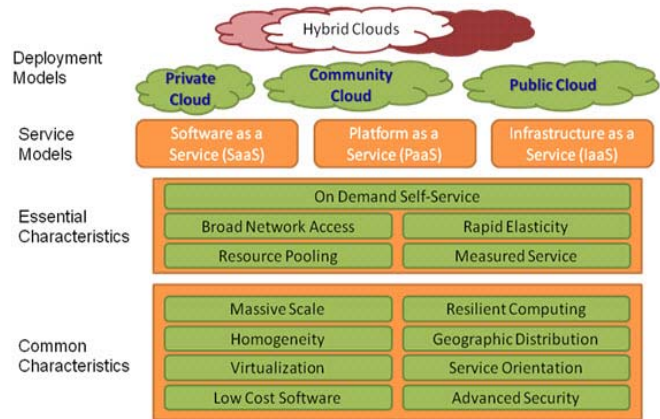
In Platform as a Service, platform of integrating the operating systems, middleware, application software or an environment development which encapsulates the services. It is based on virtual machines and provided by web browsers or client software which is provided by cloud providers using internet.

In Software as a Service, Software is a "service" which is a complete application that is offered on demand. It is like renting the software to the users, such software is accessed by both web browsers and Cloud client or front end.

IV. CLOUD ERP

The principles of ERP are implemented through Cloud Computing. This new paradigm offers various deployment models as a key determinant of the cloud environment i.e. public, private, community and hybrid clouds. In public clouds, the infrastructure and other cloud services are made available to the general public over the Internet. The cloud is owned and managed by a Cloud Service Provider (CSP) who offers services to consumers on a pay-per-use basis. Private cloud's infrastructure is owned and used by a single organization. It can be managed by the organization itself or by a third party internally or externally. In community cloud, infrastructure is shared between many organizations with common concerns such as security, policy, mission, and compliance. These clouds are managed and hosted internally or externally through a third party. Hybrid cloud is a combination of two or more cloud infrastructures that remain

unique entities, but are bounded together to provide advantages of multiple cloud structure.



The NIST definition identifies essential characteristics, service models and deployment models (Mell and Grance, 2009)

V. CLOUD ERP AND MULTI-TENANCY SYSTEM

Multiple independent users or consumers share the same physical infrastructure and SaaS, and in a scenario where the tenants which share a pool of resources will causes the problem of security. To secure the assured multi-tenants framework refers to protecting information and information systems from unauthorized access, use, disclosure, disruption, modification, inspection, recording or destruction.

VI. LITERATURE REVIEW

A literature review is a method for gathering knowledge from the existing literature. The literature review in this paper is based on a narrative review approach and is analyzed in the tabular format. The research procedures are comprehensive and systematic. This approach is characterized by adopting explicit procedures and conditions that minimize bias. The review papers are from reputed published journals. The search process was narrowed down through the criterion that the articles needed to be published in peer-reviewed journals or conference proceedings.

TABLE 1: LIST OF TOPICS ANALYZED AND CORRESPONDING USABLE PUBLICATIONS

S. No.	Topics Searched	Papers
1.	Integration of ERP and Cloud Computing	[1], [2], [3], [4], [6], [8], [9], [10], [11], [13], [15], [16], [18], [20], [24], [25], [28], [30], [47]
2.	Identification of Critical Factors by merging the ERP with Cloud Computing	[6], [12], [14], [21], [29], [31], [32], [33], [34], [35], [36], [37]
3.	Review the issues related with Security and Privacy	[38], [39], [40], [41], [42], [44], [46], [48]
4.	Multi-tenant framework for the cloud based ERP in SMEs	[5], [7], [17], [19], [22], [23], [26], [27], [43], [45], [46], [49], [50]

Table 2: Summary of Reviewed Papers published in various journals with their conclusion

Author	Paper	Journal	Conclusion
Sharma, M. et.al	Scope of cloud computing for SMEs in India	Journal Of Computing, Volume 2, Issue 5, May 2010, ISSN 2151-9617	The comparison of the cost and the level for adaptability of using the traditional ERP solution and the cloud computing modeled SaaS based ERP systems is made using the qualitative technique.
Saini, S.L. et.al	Cloud Computing and Enterprise Resource Planning Systems	Proceedings of the World Congress on Engineering and Computer Science 2011 Vol. I WCE 2011, July 6 - 8, 2011, London	The reviews for the development of Low cost ERP Solution to Indian industries on Mobile using latest technologies such as Mobile computing, SaaS, Cloud Computing etc. is made.
G., Fathima Haseen Raihana, Jamal Mohamed	Cloud ERP- A Solution Model	IRACST - International Journal of Computer Science and Information Technology & Security (IJCSITS), ISSN: 2249-9555 Vol. 2, No. 1, 2012	It attempts to find how external cloud services (SaaS) can make ERP at low cost working with simple experience, faster and better. It also identifies the scope and benefits of cloud ERP.
Appandairajan, P. et.al	ERP on Cloud: Implementation Strategies and Challenges	Proceedings of 2012 International Conference on Cloud Computing, Technologies, Applications & Management 978-1-4673-4416-6/12/©2012 IEEE	Cloud based ERP was studied by analyzing the strategies for implementation. With the clear understanding of the strategies and challenges, Organizations can successfully implement Cloud ERP for their business applications.
Tripti Negi Mahara	Indian SMEs Perspective for election of ERP in Cloud	Journal of International Technology and Information Management Volume 22, Number 1 2013	The framework was designed to find possible benefits and threats based on the three enterprise perspectives Economical, Technological and People that a SME has while evaluating an ERP solution on Cloud in Indian SMEs.
Somani, R.K., Dadhich, R.	Design of Cloud Computing based ERP model	International Journal of IT, Engineering and Applied Sciences Research (IJIEASR) ISSN: 2319-4413 Volume 2, No. 6, June 2013	By integrating the cloud and ERP, will improve the utilization efficiency of enterprise IT resources etc. To maintain a stable business network support, Initial cost reduction in IT and lower fixed investment, Up gradation &
Jian ZHANG, Ran WANG	Applied Research on A Cloud-Based ERP Service System Within The SOA Framework	IEEE International Conference on Computational and Information Sciences (2013)	Maintenance, Scalability will prove trustworthy.
Singh, G. et.al	A Study of Impact of ERP and Cloud Computing In Business Enterprises	Proceedings of the World Congress on Engineering and Computer Science 2013 Volume 1 WCECS 2013, 23-25 October, 2013, San Francisco, USA	This study is based on the case study of China. They proposed a computing model framework of KKERP-SS. The cloud-based computing ERP system within the SOA framework is more helpful in decreasing the IT budgets for vast number of SMEs.
Hedau, V. et.al	Cloud Based ERP for Small and Medium Scale Enterprises	International Journal of Engineering Research & Technology (IJERT) Vol. 2 Issue 11, November - 2013 ISSN: 2278-0181	Cloud Computing involves the delivery virtualized IT resources as services over the Internet. Cloud Computing services are delivered in a scalable and secure manner from a remote data center on a "pay as you use" basis.
Nimitha Rai D, Pallavi K N	ERP System Integrated with Cloud Services for Small and Medium Business in India	International Journal of Advanced Research in Computer Science and Software Engineering Volume 4, Issue 12, December 2014	Cloud based ERP systems provide the right computational solutions with a cost effective manner. To manage and maintain the functioning of SMEs, cloud based ERP is the most suitable that can eventually lead their unmatched growth and development.
Elias Fathi Kiadehi, Shahriar Mohammadi	Cloud ERP: Implementation of Enterprise Resource Planning Using Cloud Computing Technology	Journal of Basic and Applied Scientific Research ISSN 2090-4304 (2012)	Cloud computing service based ERP systems provide required IT resources with reasonable cost. The study of this research provides a cloud based SaaS model pay per use ERP system to the SMEs in India.
Duan J. et.al	Benefits and drawbacks of cloud-based versus traditional erp systems	Proceedings of the 2012-13 Course on Advanced Resource Planning W.J.H. van Groenendaal (ed.)	Different aspect of traditional ERP and Cloud ERP is compared. Cloud Computing has lots of problems in security. Cloud ERP has advantages and security problems that affect the organization decision to implement Cloud ERP.
			The advantages of cloud-based ERP as lower upfront costs, lower operating costs, scalability, access to advanced technology, and improved disaster recovery may be considered as more relevant or pertinent for SMEs than for large enterprises.

Purohit G.N. et.al	Challenges Involved in Implementation of ERP on Demand Cloud Computing	IJCSI International Journal of Computer Science Issues, Vol. 9, Issue 4, No 2, July 2012 ISSN (Online): 1694-0814	Many larger organizations get more comfortable with SaaS model. Technology updating, easy adoption, scalability, data security is the main concern for growth and obstacle for the SaaS industry.	Garg, S. K., Versteeg, S and Buyya, R	SMICloud: A Framework for Comparing and Ranking Cloud Services	Fourth IEEE International Conference on Utility and Cloud Computing 2011, pp 210 – 218	per demands of SMEs. To measures the quality and prioritizes cloud services based on Service Measurement Index Key Performance Indicators.
Amini M. et.al	The Role of Top Manager Behaviors on Adoption of Cloud Computing for Small and Medium Enterprises	Australian Journal of Basic and Applied Sciences, 8(1) January 2014, Pages: 490-498	The data was analyzed through Partial Least Square (PLS). Top manager behaviors and the factors that affect on top manager behaviors influent directly and positively on adoption of new information technology like cloud computing.	Ahmad Rabay'a, Mohammad Dweib, Yousef Abuzir	Implementing Cloud Computing in ERP	Journal of Emerging Trends in Computing and Information Sciences Vol. 4, No. 10 October 2013	The purpose of this research was influenced by the potential benefits of using cloud computing technology to implement ERP systems with less time, cost and failure risk consequences, and how ERP as cloud service could ease ERP implementation and reduce required resources from both customers and vendors.
Moussa Ouedraogo and Haralambos Mouratidis	Selecting a Cloud Service Provider in the age of cybercrime	Elsevier, Computers & Security, Volume 38, October 2013, Pages 3–13 Cybercrime in the Digital Economy	A new well-defined approach, Complete-Auditable-Reportable or C.A.RE helps to determine the adequacy of a CSP sponsored security. The information is shared with the concerned Cloud Service Consumer (CSC). A level of assurance is associated to each of the C.A.RE parameters in order to help determine the overall trustworthiness of a CSP.	Guo Chao Alex Peng and Chirag Gala	Cloud ERP: a New Dilemma to Modern Organisations?	Journal of Computer Information Systems (2014)	Economical and technical benefits and legal and technical complexity barriers has been evolved.
Li, A., Yang, X., Kandula, S and Zhang, M	CloudCmp: Comparing Public Cloud Providers	Proceedings of the 10 th Annual Conference on Internet Measurement, Melbourne, Australia (2010)	A systematic comparator of the performance and cost, CloudCmp measures the elastic computing, persistent storage, and networking services offered by a cloud along metrics that directly reflect their impact on the performance of customer applications.	Shruthi Shirur, Annappa Swamy D. R.	A Cloud Service Measure Index Framework to Evaluate Efficient Candidate with Ranked Technology	International Journal of Science and Research (IJSR) ISSN (Online): 2319-7064 Index Copernicus Value (2013): 6.14 Impact Factor (2013): 4.438	By making use of QoS matrices it's quite easy to find out which service provider is best in the market. So it will implement the "Ranked Voting Method". This ranked voting system clearly find out which provider is efficient one, it can also be possible to add or remove the inefficient cloud service providers from the list.
Mouratidis, H., Islama, S., Kalloniatis, C and Gritzalis, S	A framework to support selection of cloud providers based on security and privacy requirements	The Journal of Systems and Software 86 (2013) pp 2276–2293.	A modeling language provides a structured framework that supports security and privacy requirements. There is selection of a cloud provider based on Security and privacy cataloguing, Security and privacy analysis, Selection analysis.	Gerard Conway, Edward Curry and Brian Donnellan	Cloud Computing Adoption: An SME Case Study	17 th Annual Irish Academy of Management Conference (2014)	The framework provides mainstream to assess their capability and plan for each phase of their growth and development. It can be achieved by assessing their critical capabilities across the key areas of the business, developing improvement roadmaps and reassessing their maturity.
Wu, H., Ye, D., Liu, S., Yang, Y and Bai, L	A Service Selection Approach in Cloud Manufacturing for SMEs	Proceedings of the I-ESA Conferences, Springer International Publishing Switzerland (2014)	The proposed model makes use of service selection algorithms called Single Service Selection (SSS) algorithm and Genetic Algorithm (GA) for selecting cloud manufacturing resource and providing service as	Rajeev Sharma, Dr. Bright Keswani	Study of cloud based ERP services for small and medium enterprises	Revista de Sistemas de Informação da FSMA n. 13 (2014) pp. 2-10	The cloud based web services are predicted to grow in the future. The trepidation and the economic crises have halted the momentum of cloud based services deployment.
				Iñaki Bildosola, Rosa Río-Belver, Ernesto Cilleruelo an	Design and Implementation of a Cloud Computing Adoption	PLoS One. 2015; 10(7): e0134563. Published online 2015 Jul 31. doi: 10.1371/journal.pone.013	Cloud computing is especially beneficial for startup companies, SMEs, entrepreneurs and companies that need to make new

d Gaizka Garechana	Decision Tool: Generating a Cloud Road	4563	investments or do not have a stable infrastructure.				
Liqiang Chen	Integrating Cloud Computing Services Using Enterprise Service Bus (ESB)	Business and Management Research Vol. 1, No. 1; March 2012	The proposed universal integration architecture in which any system or services can easily be integrated through the ESB can serve as foundation for streamlining BPM across multiple disparate platforms including cloud computing, ERP and other on-premise systems.				
Ashish Seth, Himanshu Agarwal, Ashim Raj Singla	Integrating SOA and Cloud Computing for SME Business Objective	WSEAS TRANSACTION S on COMPUTERS, E-ISSN: 2224-2872, Issue 3, Volume 11, March 2012	The principles of SOA-Cloud is to create an overall strategic plan and focus how architectural context support the use of cloud computing. This integrated model is ideal for medium and small sized enterprises both in terms of cost and adaptability. But security is still not the added value of Cloud Computing in the present paper.	Salauddin Dhali	A study on cloud computing adoption of small and medium enterprises	Master Thesis project, Malmo University, Department of Computer Science (2015)	SMEs cloud adoption approach is mainly cost savings, flexibility, rapid deployment and scalability. The major barriers that resist SMEs for cloud adoption the privacy, security, legal issues, vendor lock in, loss of data and interoperability issues.
Ming Hock Yew, Jenson Chong-Leng Goh	An SME's Adoption of a Cloud Based Integrated Management System (IMS) When Certifying against Management System Standards (MSS)	Australasian Conference on Information Systems 2015, Adelaide	It is the case study in which four step approach was introduced for the adoption of cloud based integrated management system. In this quality and environmental performance improvement, cost savings and productivity gains enjoyed by the SMEs.	Shima Ramezani Tehrani	Factors Influencing the Adoption of Cloud Computing by Small and Medium-Sized Enterprises (SMEs)	Thesis for the Degree of Master of Management Science, Toronto, Ontario, Canada	Based on two dominant theories in the field of diffusion of innovation, a conceptual model is proposed. To determine the factors influencing the cloud computing adoption by Small and Medium sized Enterprises (SMEs).
Khamis Haji Salum, Mohd Zaidi Abd Rozan	Barriers and Drivers in Cloud ERP Adoption Among SMEs	Journal of Information Systems Research and Innovation 9(1), 9-20, February 2015	The paper extracts the barriers and drivers in cloud ERP adoption. The barriers and drivers are grouped under the headings of technology, the environment, organizational factors, economic factors, innovation, business model, human factors when evaluating the decision to adopt cloud ERP.	Siti Aisyah Salim	Cloud ERP Adoption-A Process View Approach	Information Systems School, Queensland University of Technology, Australia	The attempt is to explore which factors are relevant to the distinct phases of cloud ERP adoption. The factors are classified as "necessary" or "sufficient"; where "necessary" factors need to exist in order for the firm to move to the next stage, while "sufficient" means assisting in the movement. It assists the ERP and cloud vendors in prioritizing and upgrading their business quality at any point in time during the adoption process, which would thus increase the likelihood of cloud-based ERP adoption among SMEs.
Björn Johansson, Amar Alajbegovic, Vasileios Alexopoulos, Achilles Desalermos	Cloud ERP Adoption Opportunities and Concerns: A Comparison between SMEs and Large	Pre-ECIS 2014 Workshop "IT Operations Management" (ITOM2014), Lund University Publications (Conference paper)	A hybrid solution, where the most critical and resource-demanding modules are kept on-premise or hosted in a private, single-tenant cloud, while less critical ones are deployed on a public cloud, were	Moutaz Haddara, Ahmed Elragal	ERP adoption cost factors identification and classification : a study in SMEs	International Journal of Information Systems and Project Management, Vol. 1, No. 2, 2013, 5-21	This research explores the direct and indirect cost factors that occur in ERP adoptions in Egyptian SMEs. Also, this study investigates the influence of some SME-specific contextual factors on costs. Moreover, the paper provides a ranking of cost factors according to their impact on total adoption

Ezer Osei Yeboah-Boateng, Kofi Asare Essandoh	Factors Influencing the Adoption of Cloud Computing by Small and Medium Enterprises in Developing Economies	International Journal of Emerging Science and Engineering (JJESE) ISSN: 2319-6378, Volume-2, Issue-4, February 2014	costs. The different factors influencing the adoption of cloud computing are cost reduction on IT infrastructure and maintenance, improved communication, scalability and business continuity as the main drivers of cloud adoption, whereas lack of knowledge, poor internet connectivity, security of cloud services, lack of trust and interoperability with existing systems were identified as barriers to adoption.				
Nazli Sadat Safavi, Mahyar Amini, Seyyed AmirAli Javadinia	The Determinant Of Adoption Of Enterprise Resource Planning For Small And Medium Enterprises In Iran	International Journal of Advanced Research in IT and Engineering ISSN: 2278-6244 Vol. 3 No. 1 January 2014	The various factors are considered as the most determinants of ERP by combining both DOI theory and TOE framework. These factors are relative advantage, complexity, compatibility, Trial ability, technology readiness, top manager support and competitive pressure.	Yunchuan Sun, Junsheng Zhang, Yongping Xiong, and Guangyu Zhu China	Data Security and Privacy in Cloud Computing	Hindawi Publishing Corporation, International Journal of Distributed Sensor Networks Volume 2014, Article ID 190903, 9 pages	This paper surveyed different techniques about data security and privacy, focusing on the data storage and use in the cloud, for data protection in the cloud computing environments to build trust between cloud service providers and consumers.
Tripti Mahara	PEST-Benefit/Threat Analysis for selection of ERP in Cloud for SMEs	Asian Journal Of Management Research Volume 3 Issue 2, 2013	PEST framework analyzes Political, Economical, Social and Technological factors. These factors should be addressed by the SME before selecting ERP in Cloud environment.	Sunil Yadav, Kanishk Bahadur Singh	Evaluation and Review of Security Algorithm on Cloud Computing Environment	International Journal of Innovative Research in Computer and Communication Engineering (An ISO 3297: 2007 Certified Organization) Vol. 3, Issue 4, April 2015	The various cryptographic algorithms on a cloud network conclude that the algorithms implemented are more efficient than using them on single system. The simulation was done on the eclipse and the graphical results were shown by using mat lab. It is observed that performance of an algorithm on a cloud network varies according to the type of the algorithm such as symmetric, asymmetric or hashing and it also varies with the size of the input.
Balasubramanian V. and Mala T.	A Review On Various Data Security Issues In Cloud Computing Environment And Its Solutions	ARPJ Journal of Engineering and Applied Sciences VOL. 10, NO. 2, FEBRUARY 2015 ISSN 1819-6608	A systematic review of security issues for cloud environments are enumerated which are the main cloud threats. Cloud Security issues and mitigation strategies are discussed and then solutions are concluded in the present paper.	Sunil Kumar Khatri, Himanshu Singhal, Khushboo Bahri	Multi-Tenant Engineering Architecture in SaaS	International Journal of Computer Applications (2013) (0975 – 8887)	This paper integrates Multi-tenancy with SaaS-based ERP system. The proposed architecture introduces the concept of fully modular system, where different modules can be implemented and configured according to the necessities of the user and further improved based on the requirements. Modular conceptual approach for SaaS architecture caters all the possible features at the customer end, such as security, scalability, reliability, customization and extensibility.
Keiko ashizume, David G Rosado, EduardoFernández-Medina and Eduardo B Fernandez	An analysis of security issues for cloud computing	Hashizume et al. Journal of Internet Services and Applications 2013, A Springer Open Journal	Sharing resources allow attackers to launch cross-tenant attacks. The relationship between the threats, vulnerabilities, and countermeasures are taken into consideration for the analysis of the security in cloud computing.	Varun Krishna	Security Issues and Countermeas	International Journal of Engineering	This research paper illustrates a brief description of what
Monjur Ahmed and Mohammad Ashraf Hossain	Cloud Computing And Security Issues In The Cloud	International Journal of Network Security & Its Applications (IJNSA), Vol.6, No.1, January 2014	The security issues in cloud computing are very sensitive and crucial from the sociological and technological viewpoints. Technological				

	ures in Cloud Computing Environment	Science and Innovative Technology (IJESIT) Volume 4, Issue 5, September 2015	exactly cloud computing security-related issues are, and discusses data security and privacy protection issues associated with cloud computing during all stages of data life cycle.				
Rotimi Rowland Ogunrinde, Yusmadi Yah Jusoh	Investigating Cloud ERP Providers Selection for SMES in A Multi-Tenant Environment	International Journal of Enhanced Research in Management & Computer Applications, ISSN: 2319-7471 Vol. 3 Issue 11, November-2014, pp: (6-15)	The current state and use of several Cloud ERP Service Providers selection methods has been examined with eventual focus on the security and privacy criteria of service selection. A Multi-Tenant Security Assurance framework for SMEs in decision making on Cloud ERP Provision selection to be proposed.	Yvette E. Gelogo, Haeng-Kon Kim	Smart Mobile ERP System on the Cloud Framework	Advanced Science and Technology Letters Vol.49 (SoftTech 2014), pp.112-115	Cloud based ERP benefits customers by providing application scalability and reduced hardware costs. Cloud computing technology made it easier to deliver our ERP software as a service (SaaS) for customers who want to acquire cloud ERP and not have to manage hardware, software, and upgrades while reducing up-front cost.
Sumitra Binu, Dr. J. Meenakumari	A Security Framework For An Enterprise System On Cloud	Indian Journal of Computer Science and Engineering (IJCSE) Vol. 3 No.4 Aug-Sep 2012	The security framework is designed in which physical security, communication security, access security, data storage security and application software management are integrated to secure the cloud.	Christina Albert Rayed Assad	Building a Cloud ERP Framework for Modern Business in Developing Countries	International Journal of Emerging Technology and Advanced Engineering Website: www.ijetae.com (ISSN 2250-2459, ISO 9001:2008 Certified Journal, Volume 5, Issue 7, July 2015)	This study provides a framework for businesses to adopt the cloud ERP. In cloud ERP, the challenge of data security, business profit, Internet accessibility and the total cost become initial issues for businesses to choose a fit one. Cloud computing technology made it easier to deliver our ERP software as a service (SaaS) for customers who want to acquire cloud ERP and not have to manage hardware, software, and upgrades while reducing up-front expenses.
Fumei Weng and Ming-Chien Hung	Competition and Challenge on Adopting Cloud ERP	International Journal of Innovation, Management and Technology, Vol. 5, No. 4, August 2014	Cloud ERP is very good proposition for a start-up, and is simple to deploy, organization need not to bear additional server and other dependent costs. It is also easy and quick to implement ERP to a business organization. However, on cloud ERP, the challenge of data security, business profit, Internet accessibility and the total cost become initial issues for businesses to choose a fit one.				
Bhavna Makhija, VinitKumar Gupta, Indrajit Rajput	Enhanced Data Security in Cloud Computing with Third Party Auditor	International Journal of Advanced Research in Computer Science and Software Engineering Volume 3, Issue 2, February 2013	The concept of Third Party Auditor is used. TPA makes task of client easy by verifying integrity of data stored on behalf of client. In cloud, there is support for data dynamics means clients can insert, delete or update data so there should be security mechanism which ensure integrity for the same. Here TPA can not only see the data but he can access or modify data also so there should be some security mechanism and also beneficial for the CSP to				

VII. CONCLUSION

This review paper presented an overview of the research papers associated with the study to explore a list of factors that lead to cloud ERP adoption, and discusses the preliminary findings of research attempting to identify and categorize the critical factors responsible for the implementation of cloud based ERP. Currently, as identified from the various studies, multi-tenant cloud framework is framed. Multi-tenant framework faced with two major sources of threats: virtualized infrastructure which can be attacked by the exploitation of possible security vulnerabilities in the massive and complex virtualized pile of software; also, attacks from unauthorized accesses to sensitive and precious data from cloud operators. The studies reveal that there is a challenge to the security and privacy of data in cloud environments. A couple of researchers have worked in the area of ensuring security in the multitenant domain.

For future work, firstly, we seek to identify the selection target, clear selection goal and clear solution for the problem of selection of cloud SaaS provider. Secondly, propose a Multi-Tenant Security Assurance framework for SMEs in decision making on Cloud ERP provision selection. Thirdly, we seek to develop a prototype based on the proposed framework, capable of addressing the problem of choosing suitable Cloud ERP providers for the SMEs based on the security and privacy provided by the providers in a multi-

tenant environment. This framework is expected to be validated via tangible evidence which includes real case studies and expert reviews, to afford it more applicable when it comes to the industrial environments.

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